

REMARKS/ARGUMENTS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-20 are pending in the application. Claims 1-4, 6, 10-14 and 16-20 are amended, and Claim 21 is canceled by the present amendment. Support for the amended claims can be found in the original specification, claims and the drawings.¹ No new matter is presented.

In the outstanding Official Action, Claims 1-21 were rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement; Claims 1-4 and 10-21 were rejected under 35 U.S.C. § 112(a) as unpatentable over Steinberg (U.S. Patent No. 6,795,523) in view of Bernardi (U.S. Patent No. 4,891,833); and Claims 5-9 were rejected under 35 U.S.C. § 103(a) as unpatentable over Steinberg in view of Bernardi and in further view of Heflin (U.S. Patent No. 4,628,523).

Claims 1-21 were rejected to under 35 U.S.C. § 112, first paragraph, and the outstanding Official Action states that this rejection can be overcome by reciting “a laser beam generator”.² In response, the claims are amended, without prejudice or disclaimer, to recite “laser beam generator” and “laser beam”, as recommended in the outstanding Official Action.

Accordingly, Applicant respectfully requests that the rejection of Claims 1-21 under 35 U.S.C. § 112, first paragraph, be withdrawn.

The outstanding Official Action rejected Claims 1-4 and 10-21 under 35 U.S.C. § 112(a) as unpatentable over Steinberg in view of Bernardi. Applicant respectfully submits that amended independent Claims 1, 10, 14 and 19-20 state novel features clearly not taught or rendered obvious by the applied references.

¹ See e.g., specification at Figs. 2, 5, 11-12 and 15-23, and original Claim 21.

² Outstanding Official Action, p. 2.

Amended Claim 1 relates to a collimating device for controlling a radiation field of an X-ray radiator. The device includes a first and second plurality of collimating leaves, and a beam generator configured to generate a laser beam between the first and second plurality of collimating leaves. The laser beam emanated between the first and second plurality of leaves has an axis perpendicular to an axis of the radiated X-ray. A memory is also provided in the device which stores position information corresponding to each leaf of the first and second plurality of collimating leaves when said each leaf is determined to intersect the laser beam based on the detection. A controller then positions each leaf based on the position information to control the radiation field.

The device of amended Claim 1 allows for the precise movement and placement of each of the plurality of collimating leaves to create an aperture through which the radiated X-ray is directed. As a result of this increased accuracy, a radiation field can be more reliably and accurately formed.

The requirements for a *prima facie* case of obviousness are (1) there must be some suggestion or motivation in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the prior art reference must teach or suggest all the claim limitations. It is respectfully submitted that the outstanding Office Action fails to make a *prima facie* case of obviousness, because neither Steinberg nor Bernardi, alone or in combination, teach all the features recited in the pending claims.

The outstanding Official Action admits that Steinberg, the primary reference, fails to teach or suggest a beam generator, a detector, a memory, and a controller; as recited in amended Claim 1. To cure these above-noted deficiencies in Steinberg, the Official Action relies on Bernardi.

Bernardi describes a dynamic scanning X-ray machine having a detector (26) with an array of crystals which respond to the radiated X-rays and a pair of blinder plates (40 and 42) used to partially cover the detector to prevent deterioration from the radiated X-rays.³ The blinders are adjusted to prevent the overflow X-ray radiation (78 and 79) emitted onto the object (22) from prematurely deteriorating the detector array (26). To facilitate movement of the blinders, a light source (200) is used to create an optical light field (203), which after reflection by a 45 degree mirror (204), propagates parallel to the path of the X-ray beam (34).⁴ Each of the blinders include an optical sensor (70/72) for detecting the visible light, and are adjusted so as to allow a portion of non-attenuated X-ray beams to radiate through to the detector (26) so that main sensor calibration can be performed.⁵

Amended Claim 1 recites, *inter alia*, a collimating device, comprising:

...a laser beam generator configured to generate a laser beam which emanates between the first and second plurality of collimating leaves, ***the laser beam having an axis perpendicular to an axis of the radiated X-ray between the first and second plurality of collimating leaves...***

An exemplary, non-limiting embodiment of the above-noted feature is depicted in Fig. 5. Specifically, the beam (40) emanates between the plurality of collimating leaves (141A/141B) on an axis that is perpendicular to the axis of the radiated X-ray (I).

In contrast, as discussed above, Bernardi describes that the light field is reflected by the mirror (204) to be propagated in a manner that “closely coincides” or is parallel to the X-ray beam (34).⁶ Therefore, when the light beam passes through the blinders (42 and 40) it clearly does not have ***an axis perpendicular to an axis of the radiated X-ray***, as recited in amended Claim 1, but instead has an axis that is substantially parallel to the radiated X-ray beam.

³ Bernardi, abstract.

⁴ Id., col. 5, lines 6-11 and Fig. 10.

⁵ Id., col. 5, line 30-col. 6, line 31 and Fig. 10.

⁶ Id. Fig. 10.

Further, there is no suggestion or motivation to modify the reference since the proposed modification asserted in the outstanding Office Action, would render the device of Steinberg unfit for its intended purpose, and would change the principle of operation of Steinberg's device.

The outstanding Official Action states that "it would have been obvious...to use the beam generator disclosed by Bernardi in the Steinberg collimating apparatus...to find the optimal positioning of the plurality of collimating leaves which would reduce unnecessary radiation to the patient."⁷ Applicants respectfully traverse this assertion.

Specifically, Steinberg describes that his device is used to adjust collimating leaves to focus a pattern of radiation on a patient. In contrast, Bernardi describes that an amount of "unattenuated" radiated X-ray beam must pass beyond the object (22) being X-rayed so that the X-ray beams can be detected by the main detector array (26) for appropriate calibration. Therefore, in order for the X-ray beam of Bernardi's device to be properly adjusted, the blinders (40 and 42) must allow a predetermined amount of radiation to pass through the X-rayed object (22) to the main detector array (26) in the direction of the radiated beam. Such a configuration clearly can not be utilized in Steinberg's device, since the goal of Steinberg's device is to limit the amount of radiation to which a patient is subjected. In the case that the object (22) in Bernardi is a person, the radiation pattern would have to cover enough of the patient so that an amount of unattenuated X-ray would reach the main detector array (26), thereby causing undue harm to the patient.

Therefore, an attempt to bring the isolated teachings of Bernardi's apparatus into Steinberg's device would render Steinberg's device inoperable and unfit for its intended purpose, because Steinberg's device would then have to be configured so that enough excess radiation is emitted on a patient so that a portion of unattenuated X-ray reaches the main

⁷ Outstanding Official Action p. 3.

detector array (26). It is unclear how such a redesign is possible, much less desirable. Such a modification would require substantial reconstruction or redesign of the primary elements of Steinberg and/or change of the basic principle of operation of Steinberg's device. There is no evidence that a person of ordinary skill in the art would be motivated to perform such changes and redesign.

Further, Bernardi describes that an optical sensors (70 and 72) are placed on each of the blinders (40 and 42) to detect the emitted light beam (203) and make necessary adjustments based on this detection. However, as depicted in Fig. 3, Steinberg's device includes a large amount of collimators, and therefore attaching a light sensor to each of the collimators, as described by Bernardi would clearly increase the size, complexity and cost of Steinberg's device. Further, given the proximity of each of the collimators in Steinberg's device, it is not clear how an optical sensor could possibly be attached to each of the collimators. Specifically, Bernardi describes that light is detected on the edge of each of the collimators and since the edges of one of the collimators may be shielded by the edges of other collimators in Steinberg's device depending on the configuration, it is unclear how light could be detected by a sensor on the edge of each collimator.

In rejecting a claim under 35 U.S.C. § 103(a), the U.S. PTO must support its rejection by "substantial evidence" within the record and by "clear and particular evidence" suggestion, teaching or motivation to combine the teachings of different references. As discussed above, there is no substantial evidence, nor clear and particular evidence, within the record of motivation to modify Steinberg by incorporating the blinder movement method of Bernardi. Without such motivation and absent improper hindsight reconstruction, a person of ordinary skill in the art would not be motivated to perform the proposed modification and Claims 1-20 are believed to be non-obvious and patentable over the applied references.

Accordingly, for at least the reasons discussed above, Applicant respectfully requests that the rejection of Claim 1 under 35 U.S.C. § 103 be withdrawn. For substantially the same reasons as given with respect to amended Claim 1, it is also submitted that amended independent Claims 10, 14 and 19-20 patentably define over Steinberg and/or Bernardi.

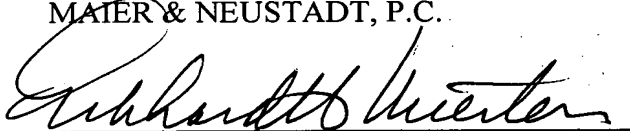
As discussed above, Steinberg neither alone or in combination with Bernardi teach or suggest a laser beam generator configured to generate a laser beam which emanates between the first and second plurality of collimating leaves, the laser beam having an axis perpendicular to an axis of the radiated X-ray between the first and second plurality of collimating leaves. Likewise, Heflin fails to remedy this deficiency, and therefore, none of the cited references, neither alone nor in combination, teach or suggest Applicants Claims 5-9 which include the above-distinguished features by virtue of dependency.

Accordingly, Applicant respectfully requests that the rejection of Claims 5-9 under 35 U.S.C. § 103 be withdrawn.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by Claims 1-20 is enabled and patentably distinguishing over the applied references. The present application is therefore believed to be in condition for formal allowance and an early and favorable reconsideration of the application is therefore requested.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read 'Eckhard H. Kuesters', is written over a horizontal line.

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